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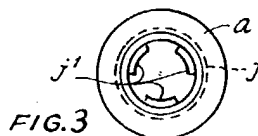
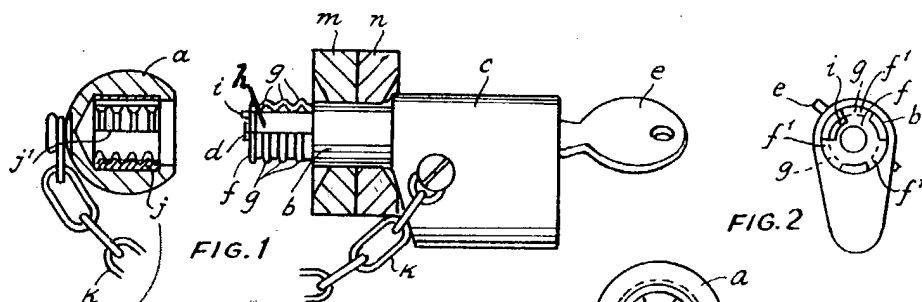
Lee

745,101

COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.



a is freely rotatable on locking when j.

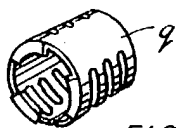
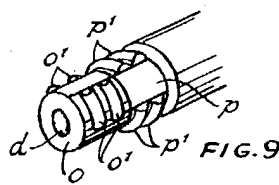
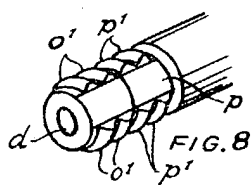
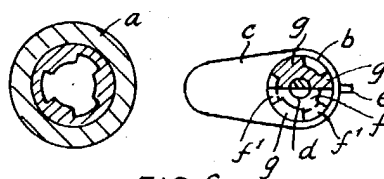
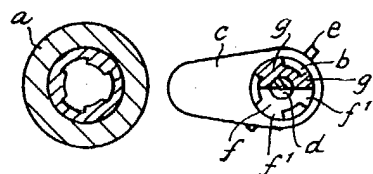
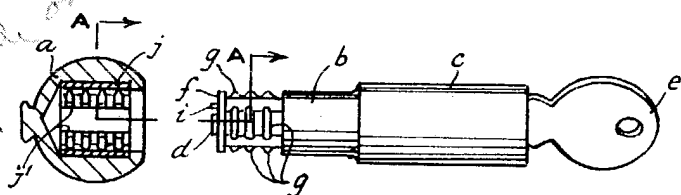


FIG. 10

172
34

Sandhu

2-1956

PATENT SPECIFICATION

745,101



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EX-101
DN-20

Index at Acceptance :—Class 44, A4F, BE13D3.

COMPLETE SPECIFICATION.

Improvements in or relating to Locking Devices or Padlocks.

I, CHARLES REGINALD GEE, a British Subject, of Low Wood, Mereside Road, Mere, in the County of Chester, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to separable two-part locking devices and is particularly, though not exclusively, applicable to detachable locking devices or padlocks.

Hitherto, padlocks have always followed a standard form consisting of the body or lock part from which slidably extends a staple-like member, adapted, when it is in the free or extended position, to be threaded through a staple and over a hasp so as to secure those parts together and thereby the parts to which they are attached. One disadvantage of such construction is the opportunity afforded by the closed figure of the staple-like member of the padlock for the insertion and use of a lever by any person attempting to force an entry. Another disadvantage of the ordinary construction aforesaid of padlock is that unless both ends of the staple-like member are secured by the lock mechanism, which is unusual, an attempt to force the same can cause bending of the said member which in turn can, by leverage, additionally stress parts of the lock mechanism and thereby reduce the security of the lock.

The object of the present invention is a separable two-part locking device having an improved construction and arrangement of parts.

According to the invention a separable two-part locking device or padlock comprises a body part with lock mechanism mounted therein, a rod-like extension therefrom, segmental tooth formations on the end of said extension, a detachable head part having complementary segmental tooth formations

adapted to be axially interposed slidably with those on the extension and to be turned relatively into axially locked engagement therewith so as thereby to prevent axial movement, and rotatable means operably connected to said lock mechanism for rotation thereby and adapted to effect relative rotational displacement of segmental tooth formations respectively on the extension and on the separable head into axially locked engagement.

The detachable locking device aforesaid may be characterised in that the detachable head part is freely rotatable on the extension while in axially locked engagement therewith, whereby rotational stresses cannot be applied to the lock mechanism ; or characterised in that the detachable head part is fitted with a rotatable sleeve in which are formed the complementary segmental formations, said sleeve being restrained against axial movement and adapted to be turned by the lock mechanism, when located on the extension of the locking device, into the axially locked or axially movable complementary positions, as required ; or further characterised in that the extension of the lock has sets of relatively stationary and rotatable segmental tooth formations whereby the rotatable formations may be displaced so that some at least of the them prevent axial movement of the head in any radial position thereof on the extension.

In the accompanying drawings :—

Fig. 1 is an exploded view in part section of one example of a detachable locking device made in accordance with the invention and showing the bracket members to be secured together thereby ;

Fig. 2 is an end elevation of the other part of the device of Fig. 1 ;

Fig. 3 is an end elevation of the head piece of the device shown in Fig. 1 ;

Fig. 4 is an exploded plan of the device shown in Fig. 1 ;

Fig. 5 is a cross-section on line A—A of

Fig. 4 with the parts in the unlocked position ;

Fig. 6 is a cross-section on line A—A of Fig. 4 with the parts in the locked position ;

Fig. 7 is an end view of the stem portion of Fig. 1 but showing a modified arrangement of locking formation ;

Fig. 8 is a perspective view showing a further modified construction of stem portion with the parts in the unlocked position ;

Fig. 9 is a view similar to Fig. 8 but with the parts in the locked position ;

Fig. 10 shows an alternative construction of sleeve for use in the arrangement of Figs. 1 to 6.

In one example of the invention as shown in Figs. 1 to 6, the improved detachable locking device or padlock is of dumb-bell shape, one end *a*, which is substantially spherical in shape, being detachable as a head piece. The other end has the waist or stem-like extension *b* integral with or permanently attached to a body part *c*, such stem being tubular. Rotatably mounted in said stem is a rod *d* secured at its inner end to the rotatable part of a cylinder tube lock mechanism (not shown), located in the body part, so as to be turned therewith by means of the key *e* and having a small disc-like head *f* secured to its outer end. On the end of the extension are segmental tooth formations *g* formed by turning grooves in the outer surface of the stem and by milling three axial or longitudinal grooves *h* radially displaced at 120 degrees so as to leave the said tooth formations each subtending about 60 degrees at the axial centre of the stem. The disc-like head *f* of the rod is of complementary star or notched formation having tooth formations *f*¹ turned to bring its notches in or out of register with those on the stem. One of the notches between the teeth *f*¹ is shaped differently from the others so as to be complementary to a stop pin *i* in the end of the stem.

The detachable head portion *a* of the device is fitted with a sleeve *j* which is rotatable therein but constrained against axial movement, and such sleeve is formed internally with tooth formations *j*¹ complementary to those of the stem.

In use, when the teeth *f*¹ of the disc-like head are in register with the teeth *g* on the extension, the head can be fitted onto the extension, the teeth in the sleeve passing down the complementary grooves on the stem, and vice versa. Thereafter, when the key is turned, the disc-like head causes the sleeve to turn relative to the stem so that its teeth are inter-digitated with those on the stem in the manner of a gun breech. Full inter-digital engagement results from a turn of 60 degrees and the cylinder lock is constructed so that the key may be withdrawn after such angle of turning movement, leaving the teeth of the sleeve and extension

fully engaged and giving maximum resistance to relative axial movement. As the sleeve *j* is freely rotatable in the head part *a*, it follows that the head part *a* is freely rotatable at all times relative to the stem and that therefore rotational stress cannot effectively be imposed thereby on the lock mechanism. As is also obvious, when the key is turned to the "unlocked" position, this turns the sleeve positively into the required position for free withdrawal of the head part *a* from the stem. The head part *a* may be permanently attached to the body part by a chain *k* or other flexible means to prevent loss when the locking device is in the unlocked position. In spite of the chain *k* the two parts are relatively separable, i.e. the function of the chain is solely to prevent loss and functionally the two parts are separable.

The improved locking device can clearly be used for location through any suitable brackets such as *m*, and *n* or through any staple of suitable size after a hasp has been placed thereover and so as to prevent removal of the hasp until the locking device has first been removed. Also, compared with the ordinary padlock the staple-like member of which can it is alleged sometimes be caused to open by a hammer blow on the lock, no such blow can disengage the complementary tooth formations as such blow cannot possibly induce the rotational movement of the lock mechanism necessary to effect such disengagement.

In a modification of the invention as shown in Fig. 7 the stem is formed with two, instead of three, longitudinal grooves, requiring a rotation of 90 degrees instead of 60 degrees for full engagement and disengagement of the complementary tooth formations. The sleeve in the head part will of course be correspondingly modified.

In a further modification as shown in Figs. 8 and 9, instead of the disc-like head *f* on the outer end of the rotatable rod *d*, there is a toothed head *o* similar to and complementary to a shorter stem *p*. The detachable dumb-bell head (not shown) has no rotatable sleeve but is formed with a blind hole or recess in which are cut the complementary tooth formations. In such arrangement the turning of the key in the lock brings the teeth *o*¹ of the rod head *o* out of register with the teeth *p*¹ of the stem and therefore the detachable head *q* cannot be removed as its internally formed teeth must be engaged either with the teeth *p*¹ on the extension *p* or with the teeth *o*¹ on the rod head *o* or with both. Turning the key of the lock back to the unlocked position brings the teeth *o*¹ in the bar head *o* into line with those *p*¹ on the stem *p* so that by turning the detachable head of the locking device its internally formed teeth may be brought into register with grooves in the stem, and vice versa and

the detachable head is then axially removable.

As shown in Fig. 10 a rotatable sleeve *q* for the detachable head *a* of Fig. 1 may be made of spring steel so that it can be sprung into position in a preformed groove in the head. Such sleeve will obviously be impossible to remove while the stem of the device is located therein.

Although the above description explains the application of the invention to padlocks, it is obvious that the two end parts could be built into the respective parts say of a safe door.

Obviously, certain features, such as the particular shape and size of the waist and dumb-bell ends of the device is a matter which may be determinable by any particular conditions of intended use, such as the size and shape of the staple with which it has to be engaged and the proximity of other adjacent matter. The waist parts of the device may be made of hardened steel, if desired, to resist cutting.

What I claim is :—

1. A separable two-part locking device, or padlock, comprising a body part with lock mechanism mounted therein, a rod-like extension therefrom, segmental tooth formations on the end of said extension, a detachable head part having complementary segmental tooth formations adapted to be axially interposed slidably with those on the extension and to be turned relatively into axially locked engagement therewith so as thereby to prevent axial movement, and rotatable means operably connected to said lock mechanism for rotation thereby and adapted to effect relative rotational displacement of segmental tooth formations respectively on the extension and on the separable head into axially locked engagement.

2. A separable two-part locking device according to Claim 1, characterised in that the detachable head part is freely rotatable on the extension while in axially locked engagement therewith, whereby rotational stresses cannot be applied to the lock mechanism.

3. A separable two-part locking device according to Claim 2, characterised in that the detachable head part is fitted with a rotatable sleeve in which are formed the complementary segmental tooth formations, said sleeve being restrained on the head against axial movement and adapted to be turned by the lock mechanism, when located on the extension of the locking device, into the axially locked or axially movable complementary position, as required.

4. A separable two-part locking device according to Claim 2, characterised in that the extension of the lock has sets of relatively stationary and rotatable segmental tooth formations whereby the rotatable formations may be disposed so that some at least of them prevent axial movement of the head in any radial position thereof on the extension.

5. The separable two-part locking device constructed, arranged and adapted to operate substantially as herein described with reference to and as illustrated in Figs. 1 to 6 or as modified in Fig. 7 or Fig. 10 of the accompanying drawings.

6. The separable two-part locking device constructed, arranged and adapted to operate substantially as herein described with reference to and as illustrated in Figs. 8 and 9 of the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Locking Devices or Padlocks.

I, CHARLES REGINALD GEE, a British Subject, of Low Wood, Mereside Road, Mere, in the County of Chester, do hereby declare this invention to be described in the following statement :—

This invention relates to locking devices and is particularly, though not exclusively, applicable to detachable locking devices or padlocks.

Hitherto padlocks have always followed a standard form consisting of the body or lock part from which slidably extends a staple-like member, adapted when it is in the free or extended position, to be threaded through a staple and over a hasp so as to secure those parts together and thereby the parts to

which they are attached. One disadvantage of such construction is the opportunity afforded by the closed figure of the staple-like member of the padlock for the insertion and use of a lever by any person attempting to force an entry. Another disadvantage of the ordinary construction aforesaid of padlock is that unless both ends of the staple-like member are secured by the lock mechanism, which is unusual, an attempt to force the same can cause bending of the said member which in turn can, by leverage, additionally stress parts of the lock mechanism and thereby reduce the security of the lock.

The object of the present invention is a

detachable locking device having an improved construction and arrangement of parts.

According to the invention a detachable locking device or padlock comprises a body part with lock mechanism mounted therein, a rod-like extension therefrom, segmental tooth formations on the end of said extension, a detachable head part having complementary segmental tooth formations adapted to be axially interposed slidably with those on the extension and to be turned relatively into axially locked engagement therewith so as thereby to prevent axial movement, and rotatable means operably connected to said lock mechanism for rotation thereby and adapted to effect relative rotational displacement of segmental tooth formations respectively on the extension and on the detachable head into axially locked engagement.

The detachable locking device aforesaid may be characterised in that the detachable head part is freely rotatable on the extension while in axially locked engagement therewith, whereby rotational stresses cannot be applied to the lock mechanism; or characterised in that the detachable head part is fitted with a rotatable sleeve in which are formed the complementary segmental formations, said sleeve being restrained against axial movement and adapted to be turned by the lock mechanism, when located on the extension of the locking device, into the axially locked or axially movable complementary positions, as required; or further characterised in that the extension of the lock has sets of relatively stationary and rotatable segmental tooth formations whereby the rotatable formations may be displaced so that some at least of them prevent axial movement of the head in any radial position thereof on the extension.

In one example of the invention the improved detachable locking device or padlock is of dumb-bell shape, one end being detachable as a head piece, the waist portion of the same being of suitable length. The other end has the waist or stem-like extension integral with or permanently attached to it, such stem being tubular. Rotatably mounted in said stem is a rod secured at its inner end to the rotatable part of a cylinder type lock mechanism, located in the body part, so as to be turned therewith and having a small disc-like head secured to its outer end. On the end of the extension are segmental tooth formations formed by turning grooves in a head-like part and by milling three axial or longitudinal grooves radially displaced at 120 degrees so as to leave tooth formations each subtending about 60 degrees at the axial centre of the extension. The disc-like head of the rod is of complementary star or notched formation so that it may be turned to bring its notches in or out of register with those on the stem.

The detachable head portion of the device

is fitted with a sleeve which is rotatable therein but constrained against axial movement and such sleeve is formed internally with tooth formations complementary to those on the extension.

In use, when the notches of the disc-like head are in register with the longitudinal grooves on the extension, the head can be fitted onto the extension, the teeth in the sleeve passing down such grooves. Thereafter, when the key is turned, the disc-like head causes the sleeve to turn so that its teeth are inter-digitated with those on the extension. Full inter-digital engagement results from a turn of 60 degrees and the cylinder lock is constructed so that the key may be withdrawn after such angle of turning movement leaving the teeth of the sleeve and extension fully engaged and giving maximum resistance to relative axial movement. As the sleeve is freely rotatable in the head part, it follows that the head is freely rotatable at all times and that therefore rotational stress cannot effectively be imposed thereby on the lock mechanism. As is also obvious, when the key is turned to the "unlocked" position this turns the sleeve positively into the required position for free withdrawal of the head part from the extension. The head part may be permanently attached to the body part by a chain or other flexible means to prevent loss when the locking device is in the unlocked position.

The improved locking device can clearly be used for location through any staple of suitable size after a hasp has been placed thereover and so as to prevent removal of the hasp until the locking device has first been removed. Also, compared with the ordinary padlock the staple-like member of which can it is alleged sometimes be caused to open by a hammer blow on the lock, no such blow can disengage the complementary tooth formations as such blow cannot possibly induce the rotational movement of the lock mechanism necessary to effect such disengagement.

In a modification the extension and sleeve are formed with two, instead of three, longitudinal grooves, requiring a rotation of 90 degrees instead of 60 degrees for full engagement and disengagement of the complementary tooth formations.

In a further modification, instead of the disc-like head on the outer end of the rotatable rod, there is a toothed head similar to and complementary to that in the extension. The detachable dumb-bell head has no rotatable sleeve but is formed with a blind hole or recess in which are cut the complementary tooth formations. In such arrangement the turning of the key in the lock brings the teeth of the rod head into register with the longitudinal grooves in the extension and therefore the detachable head cannot be removed as its internally formed teeth must be engaged

either with the teeth on the extension or with the teeth on the rod head or with both. Turning the key of the lock back to the unlocked position brings the grooves in the bar head into line with those on the extension itself so that by turning the detachable head of the locking device its internally formed teeth may be brought into register with such grooves and the detachable head is then axially removable.

Although the above description explains the application of the invention to padlocks, it is obvious that the two end parts could be built into the respective parts say of a safe door.

Obviously, certain features, such as the particular shape and size of the waist and dumb-bell ends of the device is a matter which may be determinable by any particular conditions of intended use, such as the size and shape of the staple with which it has to be engaged and the proximity of other adjacent matter. The waist parts of the device may be made of hardened steel, if desired, to resist cutting.

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